

Parts Obsolescence

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How did we find ourselves in this mess?

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Military Avionics

- **Semi-conductor business is a purely commercial business with the product availability determined by the manufacturers of computers, communications and games.**
- **Computers, communications and games are a market where the manufacturer is continually creating new demand by introducing products people want at a price they can afford.**
- **The competitive success of these industries is dependent on electronic components that can supply more features at less cost.**
- **This means that the electronic components introduced to this market will continually be changed to give more features at less cost.**
- **Since this “the market” for semi-conductors, these are the parts that will be available and which we must learn to cope with.**

Military Avionics

- **What sort of adjustments have we had to survive in the current semi-conductor environment?**
 - There is no future in taking the position that the only acceptable parts are -55⁰C to +125⁰C hermetic components. Reality is that military parts are being discontinued at an extremely high rate. The vast majority of the new parts that have come on the market over the past several years are plastic encapsulated and only available to industrial temperature range at best, and often only 0-70⁰C or less.
 - The use of surface mount technology (SMT) plastic parts is mandatory to design and produce a cost competitive product. If you elect to proceed with SMT plastic components for the typical system temperature ranges required for Hi-Rel systems, you will use parts outside the manufacturer's data sheet range.
 - This subject can not be addressed as only a technical issue. The economic issues relating to industry unwillingness to produce 883B/QML parts is the overwhelming factor.
 - You must realistically address the temperature range requirements of the end use system. It appears to be a rare situation where -55⁰C to + 125⁰C semi-conductors is actually a system requirement.

- Is the obsolescence problem better or worse for military/QML product or commercial PEMs?
 - The obsolescence problem is considerably worse when using military products.
 - The traditional long term availability of military product is based on the suppliers staying in the market.
 - Simple economics and recent history make it very apparent that the semi-conductor manufacturers that are capable of producing a reliable product are not going to make military products.

Summary of Intel Presentation Relative to Discontinuing Military Products

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- Intel military business is stable.
- Profit from military business is stable.
- The engineering resources required to support military product are extremely large.
- It is not viable use of Intel resources to continue to produce military products.

- **Companies out of the military market:**
 - **Motorola**
 - **AMP**
 - **Intel**
 - **Phillips**
- **Harris position (President John C. Garrett)**
 - **3 years ago, military sales @ \$180 million**
 - **Today, military sales @ \$60 million**
 - **Harris will focus in 3 areas**
 - >>1 Move into wireless communications and multimedia technologies**
 - >>2 Maximize discrete product sales**
 - >>3 Reduce military sales to 15%**



Rail-to-rail Inputs and Outputs with Precision Performance.

- Linear Technology's LT1366 is the newest member in a family of no-compromise rail-to-rail input and output amplifiers. This new dual op amp operates with a supply voltage as low as +1.8V and is fully specified for +3V, +5V, and $\pm 15V$ operation. The LT1366 family delivers DC precision as well as maximum dynamic range. V_{os} is 150V typ across the full rail-to-rail input range. A_{VOL} is 2 million driving a 10k load.
- The LT1366 dual and LT1367 quad are stable at all gains with load capacitances up to 1000pF.
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- The LT1366/8 dual op amps are available in 8-pin SO or 8-pin mini-DIP packages. The LT1367/9 quad op amps are available in narrow (150mil) SO16 surface mount packages. Pricing starts at \$3.46 in quantities of 1000.
- If you're looking to improve headroom and lower your operating voltage, contact Linear Technology Corporation, 1630 McCarthy Boulevard, Milpitas, CA 95035/408-432-1900. For literature only, call 1-800-A-LINEAR.

---LINEAR TECHNOLOGY

Summary of Obsolescence Situation

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- Obsolescence is a bigger problem with military products than with commercial products.
- The marketplace forces the use of current semi-conductor technology which translates to surface mount plastic.
- Obsolescence is a major and probably an increasingly severe problem.
- Semi-conductor packaging will continue to evolve so that long term piece part replacements will become increasingly difficult. (This encompasses both availability of parts and the technical difficulty of replacing some of the newer package styles.)

Approaches which do not appear to solve the obsolescence issue

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- **Transition product build to specialty companies who supply obsolete product:**
 - **Quality of product often questionable**
 - **Prices are extremely high**
 - **Parts often do not work in specific applications**
 - **Complex products typically not available**
 - **Use ASICS**
 - **Few to no ASIC suppliers who will supply in the small quantities we purchase.**
 - **Specialty manufacturers who have proprietary approaches to replacing blocks of logic**
 - **No established suppliers**
 - **Some problem as with ASIC'S, not adequate sized market**
 - **Last and final assembly buys of obsolete parts**
 - **Reluctance to commit the money required**
 - **Difficult to accurately predict needs**
 - **Adequacy of storage environment**
-

Actions that could/should be taken to minimize the obsolescence problem

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- Clearly understand that there is no magic one step solution.
- Be prepared to commit the resources to minimize the problem.
 - 1. People, the purchasing and component engineer task changes and becomes more difficult.
 - 2. There must be specific changes in how parts are managed.
 - 3. There will be on-going redesigns as parts become unavailable

- **Historically, these have been well defined and structural tasks.**
 - **1. Component engineer generated parts documents**
 - **2. Purchasing obtained parts from QPL/QMC suppliers**
- **Today, the tasks have become more challenging and require more knowledge**
 - **1. Procurement is having to buy commercial parts from suppliers of widely varying quality who discontinue parts in response to the commercial market.**
 - **2. The components must obtain high quality parts which are often used outside the manufacturers data sheet specifications.**
- **You had best make sure that the people in these jobs have both the technical knowledge and the aptitude to do the required tasks.**

Specific Actions To Be Taken To Minimize the Damage

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- The design engineer should be restricted to a very constrained set of parts that are allowable.
- This set of parts should be carefully selected to be parts that can be expected to have a reasonable life (5-7 years).
- Aggressively, work to set up cooperative agreements with competitors to share part information and hopefully procurement.
- Ideally, the automotive industry should be part of this cooperative effort.

Motorola's VHC Release Plan

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Q1 1997 Initial 18 Functions

VHC00	VHC74	VHC373
VHC02	VHC125	VHC374
VHC04	VHC138	VHC541
VHC08	VHC157	VHC573
VHC14	VHC244	VHC574
VHC32	VHC245	VHC595

Q1 1997 2nd wave (additional 17 devices)

VHCT00A	VHC240	VHC393
VHCT04A	VHCT240A	VHC540
VHC126	VHCT244A	VHCT541A
VHC132	VHCT245A	VHCT573A
VHCT138A	VHCT373A	VHCT574A
VHC139	VHCT374A	

CMOS Logic Solutions

Motorola-Logic Family Performance Comparison Honeywell

Military Avionics

Product Family	Performance ('244) max / loh/loI	Supplier	Technology	Overvoltage Tolerant
VHC	8.5ns 8mA/8mA	Motorola/Nat/Tosh	CMOS	Yes
HC	27ns 7.8A/7.8mA	Motorola/Nat/Tosh	CMOS	No
LVX(3.3V)	13.5ns 4mA/4mA	Motorola/Nat/Tosh	CMOS	Yes
AC	7.5ns 24mA/24mA	Motorola/Nat/Tosh	CMOS	No
LCX(3.3V)	6.5ns 24mA/24mA	Motorola/Nat/Tosh	CMOS	Yes
?CX(3.3V)	3.6ns 24mA/24mA	Motorola/Nat/Tosh	CMOS	Yes

CMOS Logic Solutions

The Microprocessor Is a Special Case

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- The majority of the electronic systems being designed today contain a microprocessor and associated software.
- Software is typically the most expensive item in a system design.
- The discontinuance of the microprocessor often results in the entire software package being unusable.
- The military is slowly migrating to the FAA position, i.e., “software is flight critical”.
- A reasonably portable operating system then becomes the primary consideration in microprocessor selection.
- Pick your microprocessor from a family where the manufacturer has and intend to maintain reasonable software portability.

All The Previous Actions Will Not Eliminate Rapid Obsolescence

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- **Current approach for commercial avionics is that we must utilize functional replacement at the PWB level.**
 - **1. This means that it is acceptable to replace a PWB with one that is identical in form, fit, and function at the connector level.**
 - **2. The supplier assumes total responsibility for the individual parts.**
- **Issues**
 - **1. This implies major redesign of the PWB'S, probably multiple times during the life of the system.**
 - **Where does the money come from?**
 - **Is field/depot repair possible/practical?**

The Military and Aerospace
Customer's best hope for
survival is to appear as one
virtual customer to the IC makers.

--Robert Kroeger, 5 March, 1997

Boeing Commercial Airplane Group, ECMP Users Forum II
Texas Instruments Future Directions

Cooperative Parts Management Initiative

Allied Signal

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- Parts historically used are rapidly diminishing (DMS).
- No cost effective alternatives.
- Microcircuit industry advised avionics OEMs to develop common requirements.
- Customers are worried.

Why (Continued)

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- Address Common Needs/Concerns
 - Obsolescence
 - New Technology Introduction
 - Quality/Reliability Data (DCP/RAC)
 - Common Requirements
 - >>Application Environment
 - Supplier Assessment and Selection
 - Strategic Procurement Initiatives

- Pooling Resources and Information
- Establish Market Presence